entanglement TECHNOLOGIES, INC.

ANALYTICAL REPORT

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Job ID: EA_003
Site: MEW Superfund Area

For:
Laura Levine
EA Engineering, Science, and Technology, Inc.

Authorized for release by: Anthony Miller, Ph.D.

Date: **5/11/2020**

Subject: **Analytical Testing Results**

From: **Anthony Miller, CEO**
Entanglement Technologies, Inc.

To: **Laura Levine, EA Engineering, Science, and Technology, Inc.**

Attached are the results of sample analysis performed onsite at EPA-selected properties within the MEW Superfund Area. As no EA personnel were present on site, sample point selection was performed by Alana Lee, U.S. EPA as instructed by EA. Samples were drawn directly into the onsite AROMA (Autonomous Rugged Optical Multigas Analyzer) analyzer though Teflon or Nylaflow® sample collection tubing. This testing was performed on a short-notice basis. Data reported here is for screening purposes only.

Raw data is available on file and can be provided at client request.

If you have any questions, please contact project manager Anthony Miller at (650) 204-7875.

Qualifiers

A1	Data acquisition did not meet the data completeness criterion for this analyte.
A2	Data analysis did not meet the fit quality criterion for this analyte
A3	Data analysis did not meet the timing window criterion for this analyte
D1	Pressure Anomaly
C1	The reported concentration for this analyte is below the quantitation limit.
C3	The initial calibration for this analyte did not meet calibration criteria.
C4	The calibration verification check did not meet % difference criteria for this analyte.
C5	The reported concentration for this analyte is above the quantitative limit
J	The reported result for this analyte should be considered an estimated value.
Q2	The laboratory control standard associated with this sample did not meet recovery criteria for this analyte (see LCS results for this batch in QC summary).
Q3	The quantitation limit standard did not meet recovery criteria for this analyte.
U	This analyte was not detected.

Matrices

IA	Indoor Air
LH	Liquid Headspace
SG	Sewer Gas
SV	Soil Vapor
SS	Subslab Air

Sample Type

CCV	Calibration Check Value
DS	Direct Sample
LB	Laboratory Blank
LD	Laboratory Duplicate
TD	Tedlar Bag

Glossary

DER	Duplicate error ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
MDL	Method Detection Limit
NC	Not Calculated
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
PV	Purge Volume
QC	Quality Control
RER	Relative error ratio
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points

Case Narrative

Measurements were performed at sites specified by Alana Lee, EPA Project Manager, over two days, May 6 and May 7, 2020. Measurements were performed within sewer cleanouts, manholes, indoor air, and soil vapor collection points and analyzed via the AROMA chemical vapor analyzer.

Headspace within sanitary sewer cleanouts was measured by removing the cleanout cover, inserting a sample hose ~1 foot and replacing the cover. Headspace vapor concentrations was measured in the sanitary sewers by inserting a sample tube ~1 foot into the manhole via perforations or holes in the manhole cover without moving the cover. Indoor air was sampled by placing the sample tube at specified locations. Soil vapor was measured by directly connecting the AROMA analyzer to the sample point via ¼" Swagelok connections. Prior to soil vapor measurements, 500mL of vapor was purged form the sample point using a large volume syringe. Soil Vapor collection Point HVSV-40 showed a pressure error indicating that strong vacuum was drawn on this sample point resulting in a D1 Flag and reduced sample volume.

Measurements showed very high variability in sanitary sewer headspace vapor over short time periods which led to a sequential collection of 7 samples within one hour at E 14 SC showing ~800x variation in concentration. Sanitary sewer samples were either 200mL or 2 mL depending on chemical concentration.

Daily bracketing QA/QC was performed and summarized below and passed testing criteria.

AROMA Measurement Results

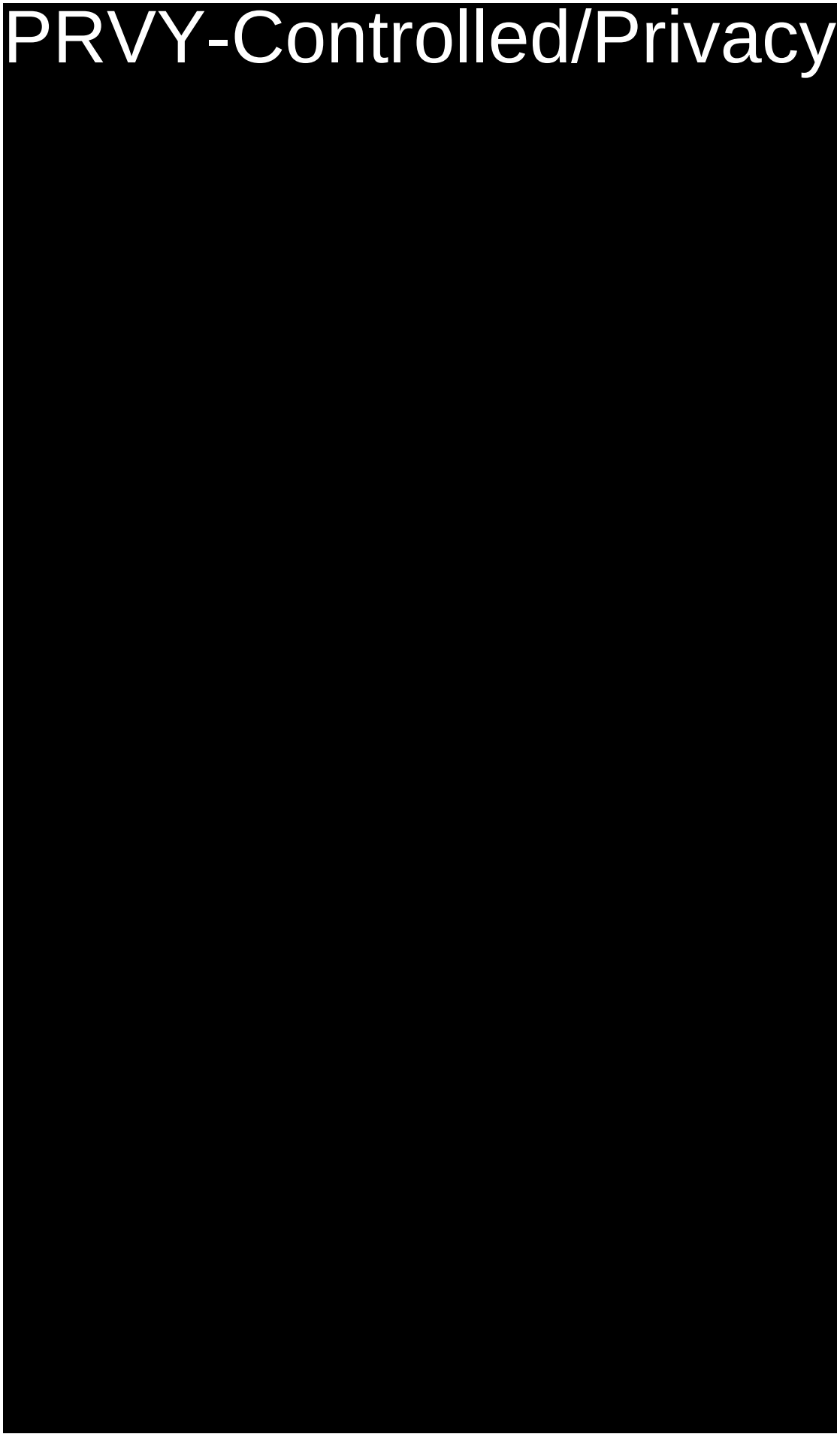
Sample Point ID	Type	Location	Sample Collection Method	Analysis ID	Date	Time	Sample Volume [mL]	Trichloroethylene Result	Flags	RL	units
E15 cleanout	SC	PRV Fairchild	Direct Sample	6823	5/6/20	12:32:51 PM	200	0.19		0.2	µg/m3
E16 cleanout	SC	PRV Fairchild	Direct Sample	6824	5/6/20	12:45:07 PM	200	2.87		0.2	µg/m3
E17 cleanout	SC	PRV Fairchild	Direct Sample	6825	5/6/20	12:54:55 PM	200	2.84		0.2	µg/m3
E18 cleanout	SC	PRV Fairchild	Direct Sample	6826	5/6/20	1:04:28 PM	200	0.76		0.2	µg/m3
E19 cleanout	SC	PRV Fairchild	Direct Sample	6827	5/6/20	1:14:09 PM	200	2.62		0.2	µg/m3
F23 cleanout	SC	PRV Fairchild	Direct Sample	6828	5/6/20	1:24:14 PM	200	1630	J	0.2	µg/m3
F23 cleanout	SC	PRV Fairchild	Direct Sample	6829	5/6/20	1:34:18 PM	2.5	685		2	µg/m3
F22 cleanout	SC	PRV Fairchild	Direct Sample	6833	5/6/20	2:19:01 PM	200	1906	J	0.2	µg/m3
272 Ariana MH3SS	MH	277 Fairchild	Direct Sample	6837	5/6/20	4:05:26 PM	200	450		0.2	µg/m3
D09 bathroom	IA	PRV Fairchild	Direct Sample	6843	5/6/20	5:50:33 PM	200	0.16	C1	0.2	µg/m3
D11 stairwell	IA	PRV Fairchild	Direct Sample	6844	5/6/20	6:04:05 PM	200	0.58		0.2	µg/m3
PRV bathroom	IA	850 leong	Direct Sample	6847	5/6/20	6:53:02 PM	200	0.92		0.2	µg/m3
PRV bathroom	IA	850 leong	Direct Sample	6848	5/6/20	7:04:17 PM	200	0.72		0.2	µg/m3
PRV bathroom	IA	850 leong	Direct Sample	6849	5/6/20	7:15:43 PM	200	0.07	C1	0.2	µg/m3
PRV nightstand	IA	850 leong	Direct Sample	6850	5/6/20	7:28:23 PM	200	0.51		0.2	µg/m3
PRV nightstand	IA	850 leong	Direct Sample	6851	5/6/20	7:40:51 PM	200	0.62		0.2	µg/m3
MH with water inlet	MH	850 leong	Direct Sample	6852	5/6/20	7:52:43 PM	200	44.98		0.2	µg/m3
MH4SS 241 Ariana	MH	277 Fairchild	Direct Sample	6864	5/7/20	9:22:05 AM	200	ND	U	0.2	µg/m3
MH5SS 231 Ariana	MH	277 Fairchild	Direct Sample	6865	5/7/20	9:33:16 AM	200	ND	U	0.2	µg/m3
D08 cleanout	SC	PRV Fairchild	Direct Sample	6866	5/7/20	9:44:57 AM	200	ND	U	0.2	µg/m3
D09 cleanout	SC	PRV Fairchild	Direct Sample	6867	5/7/20	9:55:44 AM	200	20.62		0.2	µg/m3
D10 cleanout	SC	PRV Fairchild	Direct Sample	6868	5/7/20	10:10:37 AM	200	22.76		0.2	µg/m3
D11 cleanout	SC	PRV Fairchild	Direct Sample	6869	5/7/20	10:22:29 AM	200	10.61		0.2	µg/m3
D12 cleanout	SC	PRV Fairchild	Direct Sample	6870	5/7/20	10:36:27 AM	200	0.32		0.2	µg/m3
F6-010	MH	277 Fairchild	Direct Sample	6871	5/7/20	10:50:20 AM	200	1790		0.2	µg/m3
MH1SS 261 Fairchild	MH	277 Fairchild	Direct Sample	6872	5/7/20	11:02:00 AM	2.5	364		2	µg/m3
MH3SS 272 Ariana	MH	277 Fairchild	Direct Sample	6874	5/7/20	11:27:14 AM	2.5	3.52		2	µg/m3
F23 cleanout	SC	PRV Fairchild	Direct Sample	6876	5/7/20	12:56:46 PM	2.5	5.78		2	µg/m3
F22 cleanout	SC	PRV Fairchild	Direct Sample	6877	5/7/20	1:13:41 PM	2.5	5.18		2	µg/m3
E14 sewer cleanout	SC	PRV Fairchild	Direct Sample	6880	5/7/20	2:20:21 PM	200	851	J	0.2	µg/m3
E15 sewer cleanout	SC	PRV Fairchild	Direct Sample	6881	5/7/20	2:30:58 PM	200	0.55		0.2	µg/m3
MH2SS 260 Ariana	MH	277 Fairchild	Direct Sample	6882	5/7/20	2:47:52 PM	200	448		0.2	µg/m3
MH1SS 261 Fairchild	MH	277 Fairchild	Direct Sample	6883	5/7/20	3:01:20 PM	200	635.6		0.2	µg/m3
F6-010	MH	277 Fairchild	Direct Sample	6884	5/7/20	3:15:18 PM	200	1897	J	0.2	µg/m3
F23 cleanout	SC	PRV Fairchild	Direct Sample	6886	5/7/20	3:40:12 PM	200	0.06	C1	0.2	µg/m3
F22 cleanout	SC	PRV Fairchild	Direct Sample	6887	5/7/20	3:53:09 PM	200	4.67		0.2	µg/m3
E14 cleanout	SC	PRV Fairchild	Direct Sample	6888	5/7/20	4:03:49 PM	200	34.38		0.2	µg/m3
E14 cleanout	SC	PRV Fairchild	Direct Sample	6889	5/7/20	4:14:10 PM	200	611.8		0.2	µg/m3
E14 cleanout	SC	PRV Fairchild	Direct Sample	6890	5/7/20	4:24:31 PM	200	783.18		0.2	µg/m3
E14 cleanout	SC	PRV Fairchild	Direct Sample	6891	5/7/20	4:34:54 PM	200	381.96		0.2	µg/m3
E14 cleanout	SC	PRV Fairchild	Direct Sample	6892	5/7/20	4:45:15 PM	200	28.54		0.2	µg/m3
E14 cleanout	SC	PRV Fairchild	Direct Sample	6893	5/7/20	4:55:38 PM	200	1.02		0.2	µg/m3
E14 cleanout	SC	PRV Fairchild	Direct Sample	6894	5/7/20	5:06:00 PM	200	150.7		0.2	µg/m3
F23 cleanout	SC	PRV Fairchild	Direct Sample	6895	5/7/20	5:16:43 PM	200	553		0.2	µg/m3
F23 cleanout	SC	PRV Fairchild	Direct Sample	6896	5/7/20	5:28:23 PM	200	75.14		0.2	µg/m3
HVSV-18	SV	Moffett	Direct Sample	6899	5/7/20	6:24:03 PM	200	32		0.2	µg/m3
HVSV-39	SV	Moffett	Direct Sample	6900	5/7/20	6:37:04 PM	200	5950	J	0.2	µg/m3
HVSV-40	SV	Moffett	Direct Sample	6902	5/7/20	7:00:07 PM	137	13300	J, D1	0.2	µg/m3

QC Results

Cycle ID	Date	Time	Type	Sample Volume [mL]	Trichloroethylene Result [µg/m3]	Trichloroethylene Standard [µg/m3]	Trichloroethylene RSD [%]
6811	5/6/20	9:20	CCV	200	279.5	268.71	4%
6812	5/6/20	10:09	Blank	200	ND	0	
6856	5/6/20	20:41	CCV	200	280.63	268.71	4%
6859	5/6/20	21:28	Blank	200	0.1	0	
6860	5/7/20	8:12	CCV	200	281	268.71	5%
6861	5/7/20	8:29	Blank	200	0.1	0	
6903	5/7/20	19:12	CCV	200	291	268.71	8%

Pass
Fail

CCV measurements were performed using Hydrocarbon Laboratories certified 50 ppb standard, 10% accuracy, expiration 06/21/2020. Cylinder ID 190001; PO1839.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